

**Word  
Reference  
.com**

**Verizon Online DSL with MSN® Premium**  
> Order online now and your first month is free!

verizon

English Definition



Home  
Suggestions

See Also:

[resinate](#)  
[resiniferous](#)  
[resinoid](#)  
[resipiscence](#)  
[res ipsa loquitur](#)  
[resist](#)  
[resistance](#)  
[Resistance](#)  
[resistance thermometer](#)  
[resistance welding](#)  
[resistant](#)  
[Resistencia](#)  
[resistive](#)  
[resistivity](#)  
[resistless](#)  
[resistor](#)  
[resit](#)  
[res judicata](#)  
[reskill](#)  
[Resnais](#)

resistance welding:  
[in French](#)  
[in German](#)  
[in Italian](#)  
[in Spanish](#)

[\(symbols\)](#)

Source: The Collins English Dictionary © 2000  
HarperCollins Publishers:

**resistance welding**

*noun* a welding technique in which the parts to be joined are held together under pressure and heat is produced by passing a current through the contact resistance formed between the two surfaces

Need more information?

[Ask a question in the new forum.](#)

**Ask Jeeves**  
TO FIND IT.

search now |

**Collins**  
Collins Dictionaries

# **Resistive Welders and Flickers**

**An Analysis of Solutions Using Ultracapacitors and  
Active VAR Compensation**

**1006485**

**Final Report, October 2001**

**EPRI Project Manager  
B. Banerjee**

# CITATIONS

---

This report was prepared by

EPRI PEAC Corporation  
942 Corridor Park Boulevard  
Knoxville, TN 37932

Principal Investigator  
T. Geist

This report describes research sponsored by EPRI.

The report is a corporate document that should be cited in the literature in the following manner:

*Resistive Welders and Flickers: An Analysis of Solutions Using Ultracapacitors and Active VAR Compensation*, EPRI, Palo Alto, CA,: 2001. 1006485.

# REPORT SUMMARY

---

Observable flicker in lighting can be caused by resistance welding machines, mainly due to the high level of pulse power drawn during the weld operation. This report discusses application of ultracapacitors and high-speed reactive compensation (HSRC) systems to mitigate the problem.

## **Background**

The resistive welder is a highly fluctuating load that consumes a large amount of reactive power. Unlike lighting, which for the most part is a continuous and constant load, resistive welders operate many times a minute and draw large amounts of power for short periods, after which no power is needed. This load can cause lights to flicker, shorten the life of service equipment such as transformers, and force customers to pay large penalties for poor power factor.

## **Objective**

To study the feasibility of using an ultracapacitor as an energy-storage element in a resistance welder with a goal of creating a new solution that can be used to reduce the potential for flicker.

## **Approach**

The project team focused on understanding five main areas: (1) the welding process, (2) conversion equipment, (3) flicker, (4) ultracapacitors, and (5) existing solutions with special emphasis on HSRC. For each area, the team researched requirements, advantages, disadvantages, strengths, and limitations.

First, the team studied welding operations to determine typical power profiles for such operations and key criteria for producing quality welds. Next, existing welder designs were studied as well as the application of welders and grid compatibility issues. Based on this knowledge, the team created a concept welder design with functional and design specifications. Specific emphasis was placed on understanding advantages and disadvantages of existing solutions. Based on the knowledge gained, the team developed a concept specification for a solution based on ultracapacitors. This specification was then compared to the existing HSRC solution.

The investigation's focus was resistive welding because of the large market and also because of the deep penetration of this type of welder within the industry. Other types of welding exist, such as capacitive-discharge welding. However, because of their small market size, other types of welding technologies were not included in this study.

## **Results**

Research revealed that an existing technology enables ultracapacitors to be integrated into a system that would solve flicker and other power quality problems when the system is integrated into a resistive welder. Ultracapacitors are unique in their good energy density and excellent

power density. Furthermore, the sealed and modular construction of ultracapacitors allows for a rugged and reliable system that can meet the rigorous electrical and environmental requirements of resistive welding.

Ultracapacitors are not an end product by themselves but must be combined with power electronics that shape the energy and power contained within ultracapacitors so that they are useful to the welding equipment. Therefore, it was recognized that power electronics were needed. Fortunately, power electronics at the voltage and current levels and in the configurations necessary to properly utilize the ultracapacitor energy are readily available.

A resistive welder is a mostly reactive load. This means that the welder requires delivery of volt-ampere-reactives (VARs) rather than real power. This puts ultracapacitor technology in a very favorable light because they are power rich but energy poor. The net result is that adding ultracapacitors is very cost-effective. However, power electronics are not as cost-effective because they must be sized for both VARs and kW—in other words, they must be sized for both real and reactive power. The duty cycle of a resistive welder is low (typically only five to ten percent), which does reduce the cost of electronics because of reduced thermal requirements. Still, the large amount of power drawn by resistive welders requires expensive electronics.

The flicker-solving system based on ultracapacitors was compared to an existing solution based on real-time switching of power-factor-correction capacitors. Mainly due to the cost of power electronics in the ultracapacitor-based system, HSRC would be an order of magnitude lower in cost. And, because power electronics technology is mature, the cost of power electronics is predicted to decrease from 10 to 20% over the next few years. Such a cost reduction is significant, but still leaves the solution based on ultracapacitors cost-prohibitive.

This study does not recommend ultracapacitors for resistive welding applications at this time. However, there are many niche markets in the welding industry that require unique solutions. It is possible, especially for capacitor-discharge welding, that an application could be found.

### **EPRI Perspective**

By providing utilities with a technical understanding of the performance and application of ultracapacitors and HSRC systems to the problem of flicker in resistive welding equipment, EPRI is enabling utilities to better service numerous key customer segments. With knowledge of state-of-the-art technology, electric utilities are in a unique position to help their customers value and implement new power quality mitigation solutions using solutions that may be more cost-effective or better than those based on traditional technologies.

### **Keywords**

Supercapacitor	Ultracapacitor	Power Quality
Resistive Welding	Reactive Compensation	

## ABSTRACT

---

Observable flicker in lighting can be caused by resistance welders, mainly due to the high level of pulse power drawn during the weld operation. Operation of this type of load can cause the lights to flicker, shorten the life of service equipment such as transformers, and force customers to pay large penalties for poor power factor. The objective of this project was to study the feasibility of using an ultracapacitor as an energy-storage element within a resistance welder with the goal of creating a new solution that can be used to reduce the potential for flicker. The research revealed that an existing technology enables the ultracapacitor to be integrated into a system that would solve flicker and other power quality problems when the system is integrated into a resistive welder. However, it was discovered that while the cost of the ultracapacitor was low, the cost of power electronics would make the system based on ultracapacitors cost prohibitive at this time, especially when compared to a real-time reactive control system.

## E-8 Tools and Student Machine Shop

### General

[Intro](#)
[General Rules](#)
[Shop Cam](#)
[Videos](#)

### Proctors

[Hours](#)
[Contact List](#)

### Students

[Due Dates](#)
[Groups](#)

### Tools

[Hammer](#)
[Screwdriver](#)
[Tool Tray](#)

### Shops

[Machine Shop](#)
[Sheet Metal](#)
[Wood Shop](#)
[Shop Rules](#)

### Other

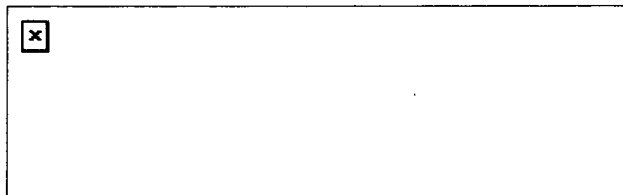
[Cutting](#)
[Speeds](#)
[Drill Bits](#)
[Glossary](#)
[Materials](#)
[Shopping](#)

### Spot Welder

The spotwelder is used to weld two thin steels together. The welder clamps the two pieces and passes a high current through them. The electrical resistance of the material causes it to melt to itself.

This is also called resistive welding. An example of good weld sizes follows below.

1. Place the material on the lower weld contact.
2. Press foot pedal down just until the contacts meet the material to be welded.
3. Now press the foot pedal down **quickly** until it stops and **quickly** release.



The dime is next to the best welds.

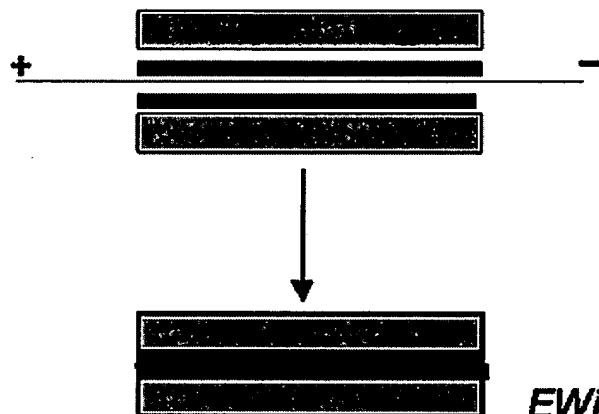
[About EWI](#) ▶[Membership](#)[Contract Services](#) ▶[Technologies](#) ▶[R & D](#)[Lab Services](#)[Education & Training](#) ▶[Conferences & Seminars](#)[Resources](#) ▶

Search

  
 [Home](#) / [Materials](#) [Joining Technologies](#) / [Plastics & Composites](#) /

## Resistive Implant Welding

Resistive implant welding is observed when an electrically conducting element is in line by application of a current (see figure). The region around the element melts and is created by the application of pressure. Sometimes, it is beneficial to include additional the bond line to provide for better melt flow and filling of gaps in the bond line.



Power supplies range from simple variable voltage transformers to programmable units that can operate in either the AC or DC mode. The resistive element can be any material that carries current, including metal wires and braids, and carbon-based elements, such as tape sheets. This process has normally been applied to larger structures and to those that require a closed-loop weld joint.

Implant welding has been applied to complicated joints in automotive applications such as bumpers and panels, joints in plastic pipe, containers and medical devices, such as oxygenators. Implant heating processes are reasonably fast, from seconds to minutes, depending on the application, and the processes can be used to join most thermoplastic-based materials. Implant materials should be compatible with the intended application, since they remain in the line.

**WeldNet® Registered in the U.S. Patent and Trademark Office**

**©1994-2004 Edison Welding Institute, Inc.**

**All Rights Reserved.**